MARCH 1979
No. 3

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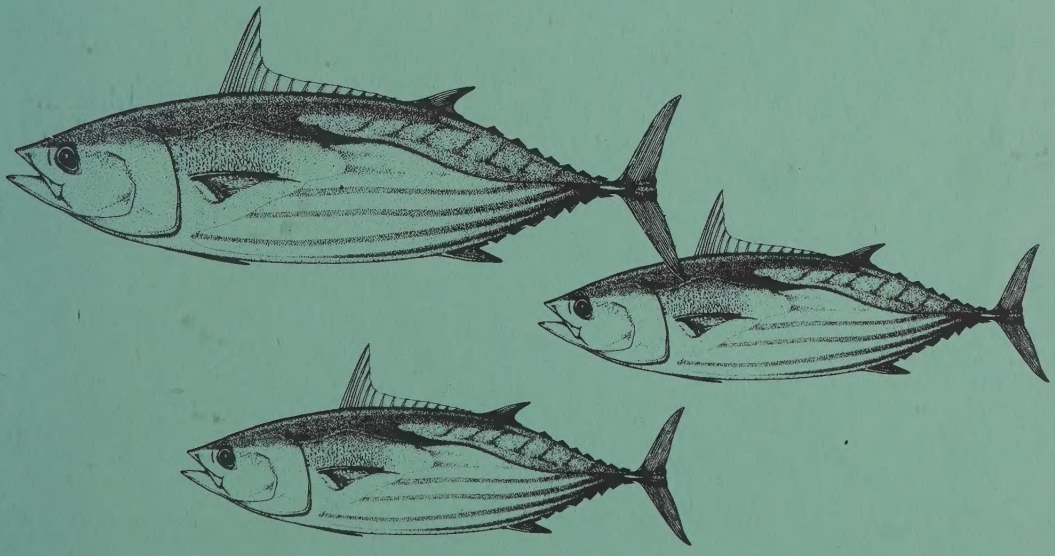
Southwest Fisheries Center-La Jolla, California



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FISHING INFORMATION

MARCH 1979, No. 3

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PREFACE

This publication, Fishing Information, appears monthly and contains 1) fishery advisory information, 2) a narrative description of pertinent surface temperature conditions, 3) charts of winds and pressures for the eastern North Pacific, 4) charts of sea surface temperature for the North Pacific and eastern tropical Pacific, and 5) charts of subsurface temperature structure in the eastern North Pacific.

A supplement to Fishing Information appears at 15-day intervals throughout the year. It contains a chart of sea surface temperature (contoured at 2°F (1°C) intervals) from Baja California to Vancouver Island out to about 135°W. Special bulletins are published in conjunction with the 15-day sea surface temperature charts which include short-term projections of albacore distribution and locations of productive fishing areas, information on oceanographic and atmospheric conditions, and other information as is appropriate during the albacore fishing season.

To cancel delivery of this publication in the event you no longer need to receive it, or to change the delivery address if you are moving but still need to receive it, please notify us by writing: James A. Renner, Editor, Fishing Information, National Marine Fisheries Service, Southwest Fisheries Center, P. O. Box 271, La Jolla, California 92038.

Submitted for publication - April 25, 1979

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ENVIRONMENTAL CHARTS ANALYZED BY:

F. Miller (Figures 8 and 9)
J. Renner (Figures 1, 2, 3, 4, 5, 6, 7, and 15 day supplement)

TECHNICAL EDITOR:
R. Allen
CARTOGRAPHY:
R. Allen, E. Portillo

Acknowledgements

The following organizations and stations contributed data for March 1979 charts:

Inter-American Tropical Tuna Commission, La Jolla, California
Kelco Company, San Diego, California
National Oceanic and Atmospheric Administration
National Marine Fisheries Service, La Jolla, California; Honolulu, Hawaii
National Weather Service, San Diego, California and Washington D. C.
National Ocean Survey, Pacific Marine Center, Seattle, Washington

Fisheries Research Board of Canada, Pacific Environment Institute, West Vancouver, British Columbia by L. F. Giovando from observations by:
J. Redhead at Langara Island Light; D. Veale at Cape St. James Light;
L. Collins at Kains Island Light; M. V. Stewart at
Amphitrite Point Light

Scripps Institution of Oceanography, La Jolla, California

Expendable bathythermograph and salinity observations are made by the mates and engineers of the *Californian* of the Matson Navigation Co. The data are processed under supervision of D. R. McLain at the NMFS Pacific Environmental Group, Monterey, California, using computer facilities of the Fleet Numerical Weather Central, Monterey. The project is partially supported by the National Science Foundation and the Office of Naval Research.

Sea Surface Temperature and Environmental Conditions

Forrest R. Miller

Eastern North Pacific

During March the Aleutian low pressure center normally shifts eastward to the southern part of Alaska near 150°W. The subtropical high pressure center is normally located near 30°N, 145°W (Figure 1). Between the Aleutian low and the subtropical high pressure systems, surface winds are usually weaker and storms less intense and less frequent than during February. Wind mixing in the surface layers of the north Pacific between 40°N and 50°N normally decreases in March when the westerly surface wind flow is less intense. Along the east and south periphery of the subtropical high pressure system, the northeast trade winds normally increase in March.

In March 1979, the Aleutian low pressure center was centered near 51°N, 175°E with a displacement of approximately 1500 nautical miles west of its normal position. However, pressures 2 to 6 millibars below normal extended eastward into the Gulf of Alaska as a result of frequent movement of weather fronts across the north Pacific (Figure 2). The subtropical high pressure center was near its normal position, but surface pressures and winds along the eastern edge of the high were slightly below normal in association with a weak upper air pressure trough along the U.S. west coast. This permitted several weather fronts to move southward along the coast to southern Baja California. Most of the storm development, high surface winds and heavy ocean wind mixing took place west of 150°W from 35°N to 50°N.

The sea surface temperature (SST) pattern for March (Figure 3) north of 35°N and east of 160°W reflected a weaker-than-normal north Pacific Ocean front, partly because the Aleutian low was west of its normal position and the persistence of above normal SST's during the past 4 months south of the Gulf of California. The area of positive SST departures diminished in size north of 40°N in March (Figure 5) primarily because storms frequently moved eastward across the north Pacific and generated extensive wind mixing along the weather fronts. Weather activity in the Gulf began in February with greater frequency than in December or January. During February and March 1979, SST's were 1 to 2°C warmer north of 30°N and west of 140°W than during the corresponding months in 1978 (Figure 7). In March 1978, SST's over the north Pacific were more than 1°C below normal because of extensive ocean mixing associated with intense storms that developed along the southern periphery of a deep Aleutian low. In March 1979, storms moving across the north Pacific appeared to be less intense than a year ago. Along the coast of north America, SST's remained below normal due in part, to the high frequency of storm activity that swept the entire west coast from Canada to Baja California. SST's were 1 to 2°C colder east of 130°W in March 1979 than a year ago (Figure 7).

Western North Pacific

During March the Aleutian low pressure system normally extends into the western Pacific north of 40°N. Pacific storms originate and develop east of Japan and along the western periphery of the Aleutian low. The storm centers and southward trailing weather fronts move rapidly eastward between 30°N and 40°N, leaving deeply mixed ocean surface layers in areas where strong surface winds develop around the storms. Storm development and ocean wind mixing usually causes marked intensification of the north Pacific Ocean front, normally

oriented east-west near 40°N. The subtropical high pressure system is centered along 30°N and normally extends across the entire western Pacific.

In March 1979, the Aleutian low pressure system was a dominant feature of the circulation north of 30°N. Storm centers frequently formed near 40°N between 155°E and 165°E and intensified rapidly along the southwestern edge of the Aleutian low system. As a result, surface pressures were 4 to 8 millibars below normal over most of the western Pacific north of 35°N. The subtropical high pressure ridge was weaker than normal west of 160°E and displaced south of its normal position. Weather fronts extending southwestward from the storm centers produced extensive cloud cover and above normal wind mixing of the ocean surface layers over a large part of the subtropical region south of 35°N, especially between 150°E and 170°E. The north Pacific ocean front was very pronounced west of 160°E (Figure 4) where the north-south SST gradient was exceptionally strong east of Japan between 37°N and 42°N. Apparently, strong advection of warmer water (northward movement) in the Kuroshio Current continued in March, as it did in February, from the islands south of Japan. Over the past two months, the ocean frontal boundary has intensified along 40°N where southward moving cold currents from the north were probably intensified by the above normal strength of the Aleutian low system. The north Pacific front appeared to be split into two or three meandering branches west of 160°E where the current systems were mixing. Positive SST departures greater than 1°C persisted south of 40°N (Figure 6) and several areas of negative departures greater than 1°C remained from wind mixing and south moving ocean currents. The alternating pattern of positive and negative SST departures east of China and south of Japan were associated with seasonal storm developments and northward advection of warm water in the Kuroshio Current east of the islands between Taiwan and Japan. The large areas of negative departures less than 1°C expanded in March south of 35°N, as a result of frequent weather fronts which extended farther than normal into the subtropical region.

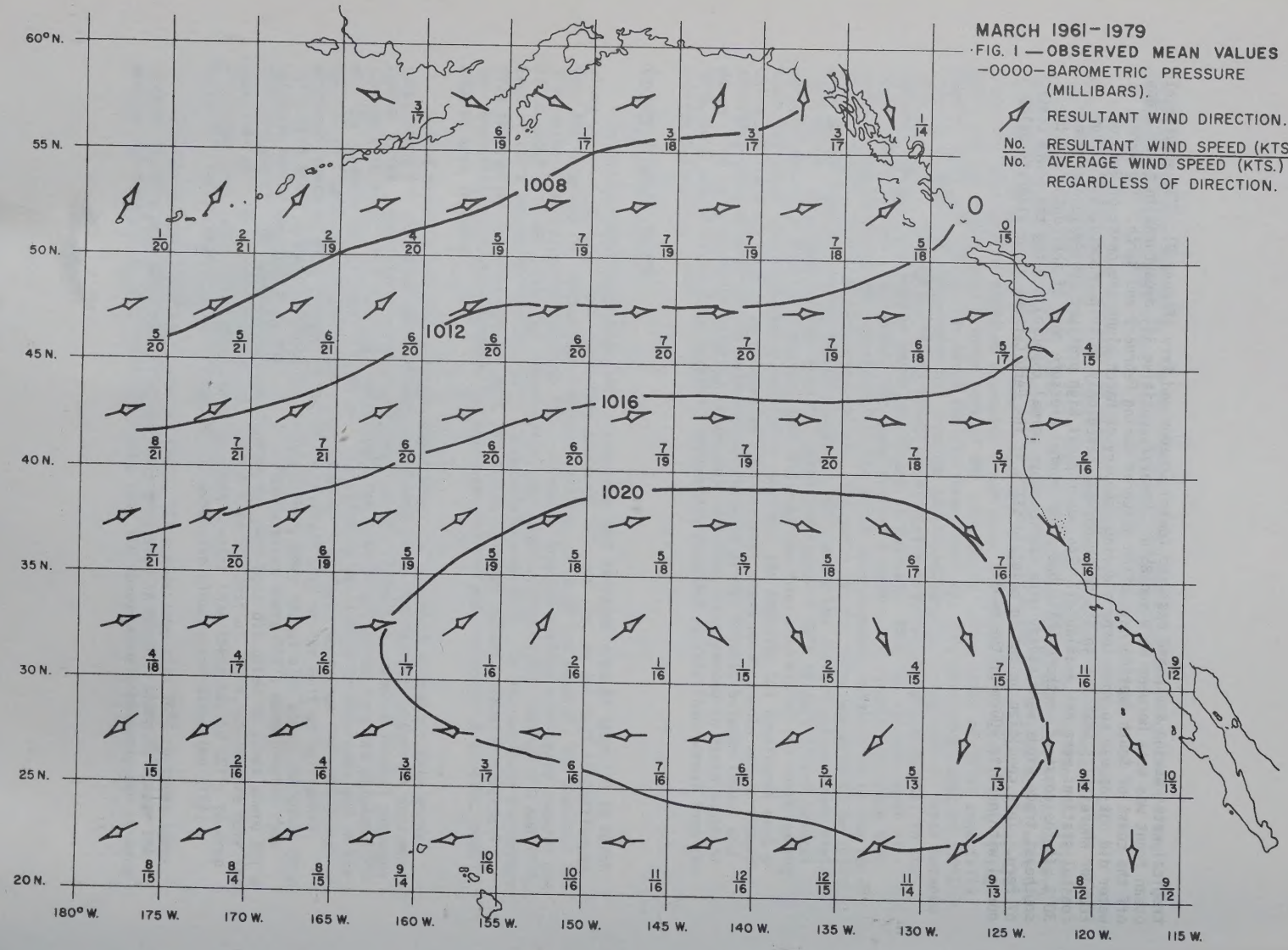
Eastern Tropical Pacific

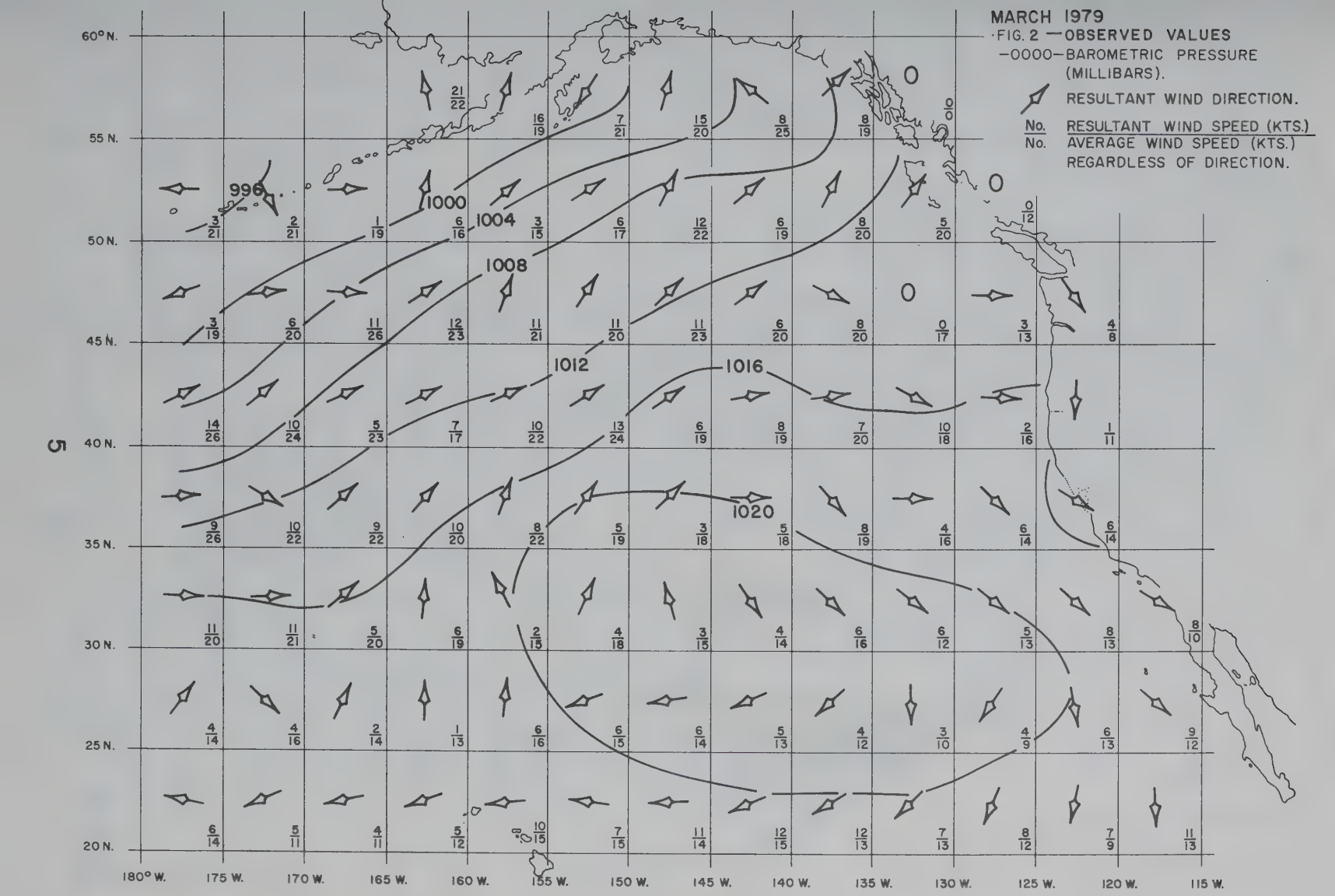
In the northern hemisphere, SST's normally cool at rates greater than 1°C in March along the west coast of Baja California south of 25°N and also in the Gulf of California. Over the remainder of the eastern tropical Pacific, north of the equator, the seasonal SST fluctuations are normally less than 1°C. Extensive squally weather with heavy showers and cloud cover develops along the intertropical convergence zone (ITCZ) between 5°N and 10°N. East of 115°W and north of 10°N, SST's frequently exceed 29°C. In the southern hemisphere from the equator to 10°S, between 85°W and 110°W, seasonal warming normally exceeds 1°C. The equatorial ocean front between the Galapagos Islands and the coast of Ecuador usually remains weak in March.

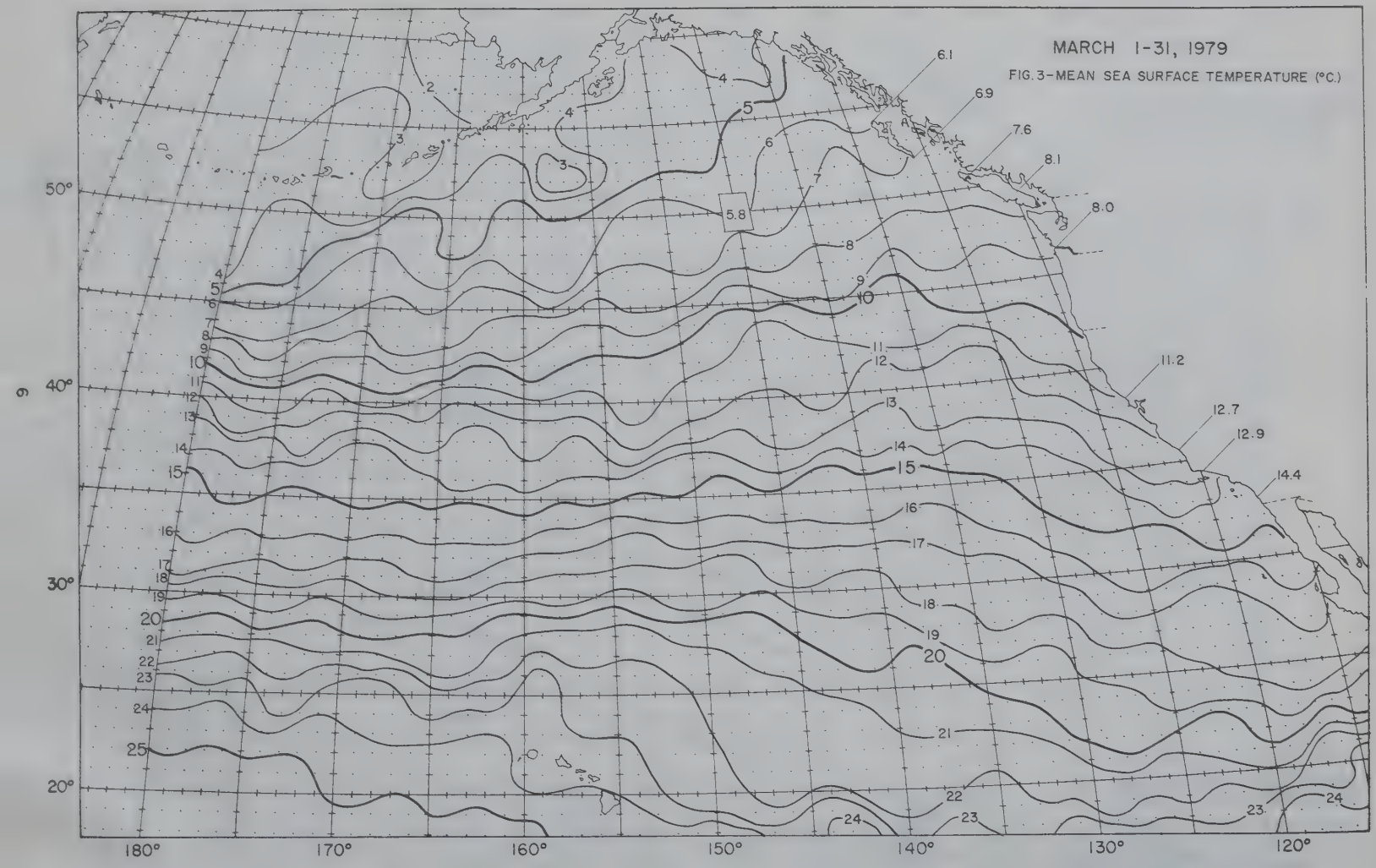
During March 1979 in the northern Hemisphere, SST's cooled at greater than normal rates along the southwest coast of Baja California where the California Current apparently pushed farther south than normal, partly as a result of frequent weather frontal passages through that area. The strongest north-south temperature gradients occurred between 20°N and the southern tip of Baja (Figure 8). Tuna fishing was active in this area and in the Gulf of California to 24°N in March. Negative SST departures more than 1°C from normal developed south of Baja (Figure 9) but in the eastern part of the Gulf of California, SST's were above normal. Surface temperatures were above normal also along the coast from southern Mexico to Costa Rica and also in offshore areas where SST's were greater than 29°C (Figure 8). By late March, tuna fishing may have been disrupted in areas where SST's were over 28°C for a prolonged period. From 5°N to 7°N east of 100°W, SST's were more than 1°C below normal where persistent easterly winds greater than 15kts caused SST's to drop below 26°C due to ocean mixing (Figure 8) and extensive cloud cover along the ITCZ.

From the equator to 5°S and east of 140°W, SST's were less than 26°C in three areas (Figure 8) where equatorial upwelling probably persisted in March. Along 85°W near the equator and from 5°S to 10°S, SST's were more than 1°C above normal, probably due to warm

tropical water moving south and eastward toward Ecuador and Peru (Figure 9). The equatorial ocean front was weak between 80°W and 85°W. However, positive SST departures in these areas off the coast of South America have often occurred during February and March. The warm water did not appear to move inshore during February or March along the coast of Peru or Ecuador where SST's were 0.5 to 1°C below normal (based only on ship reports; SST's from coastal stations were not available). The subtropical high pressure system located near 30°S off the coast of northern Chile had above normal pressure most of the month, and the southeast trade winds were steady with speeds above normal especially along the south coast of Peru. This condition helped to maintain SST's in the Peru Current at or slightly below normal within 50 to 100km of the coast.

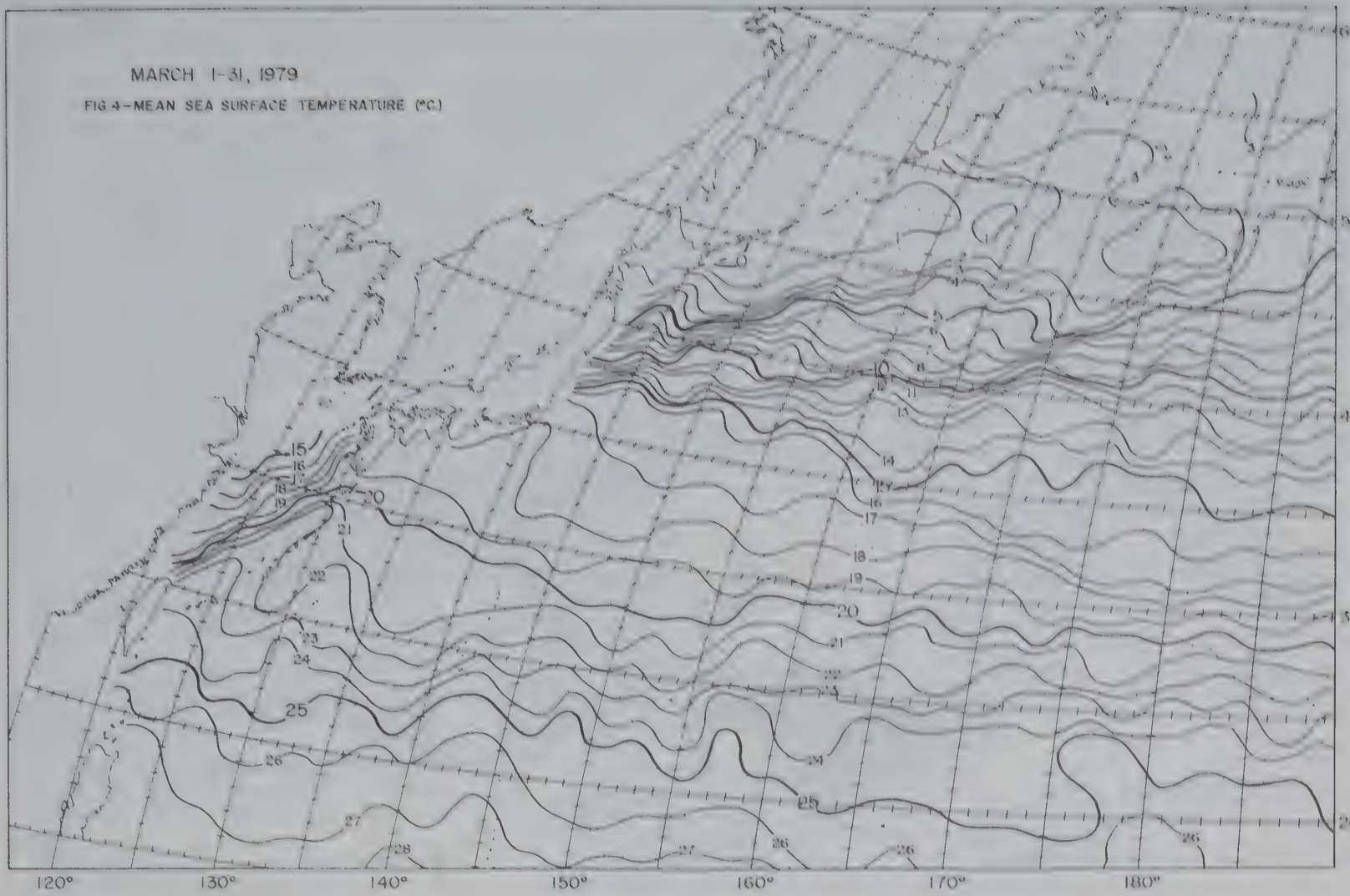

MARCH 1961-1979
FIG. 1 — OBSERVED MEAN VALUES
-0000- BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.)
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
1008
1012
1016
1020
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

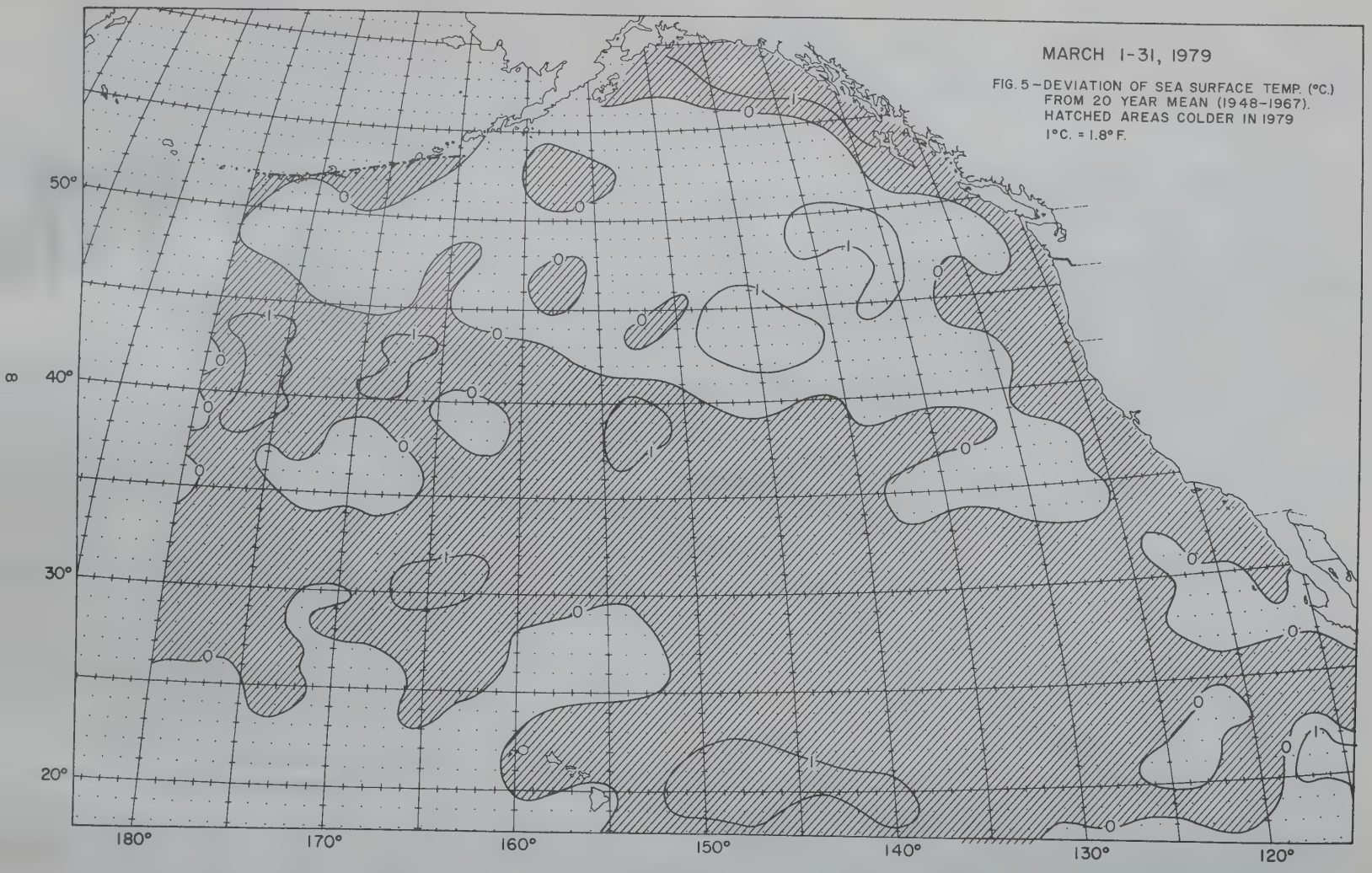

MARCH 1979
FIG. 2 —OBSERVED VALUES
—0000— BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.)
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
996
1000
1004
1008
1012
1016
1020
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

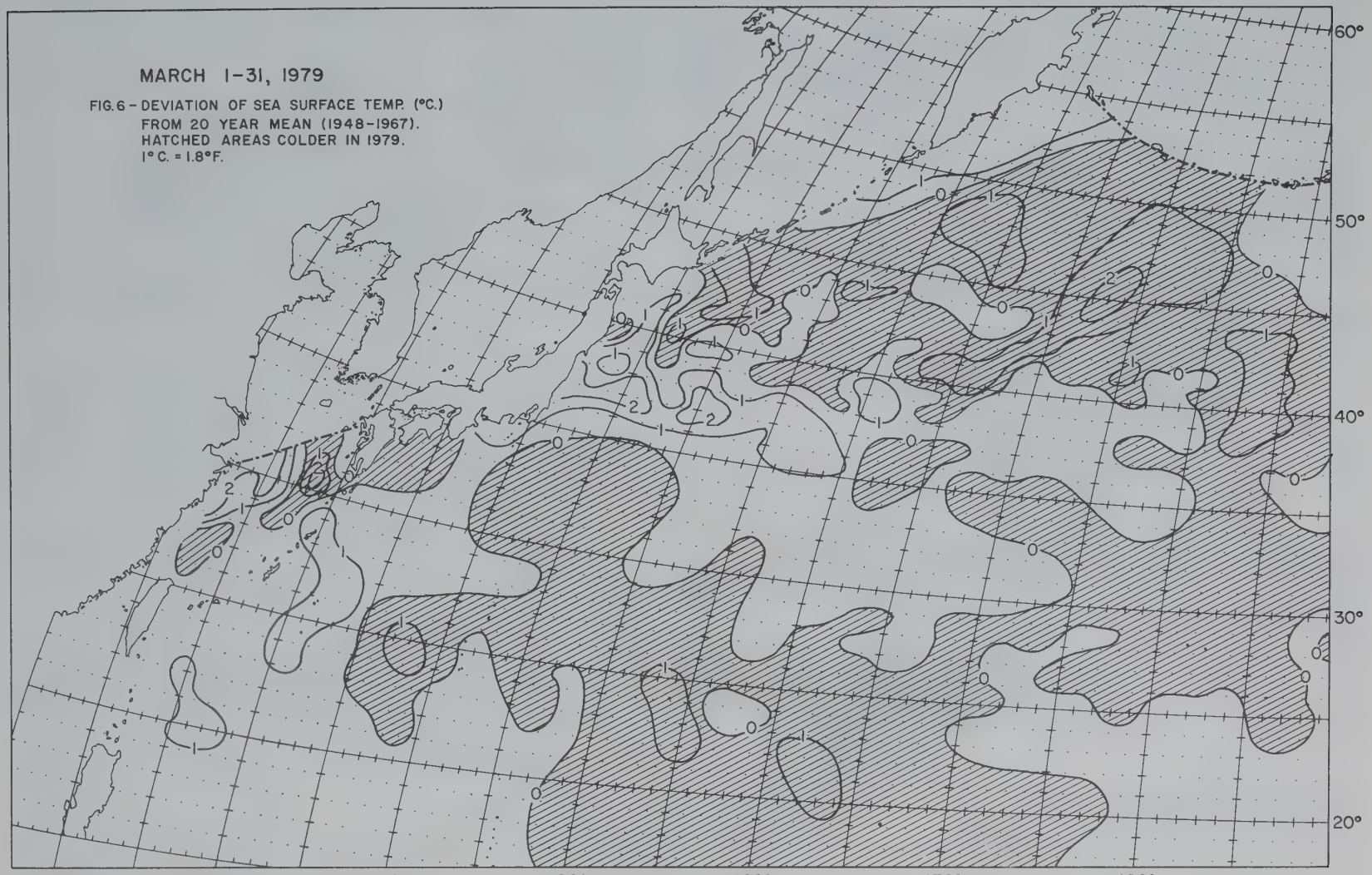

MARCH 1-31, 1979
FIG. 3-MEAN SEA SURFACE TEMPERATURE (°C.)
6.1
6.9
7.6
8.1
8.0
5.8
11.2
12.7
12.9
14.4
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°

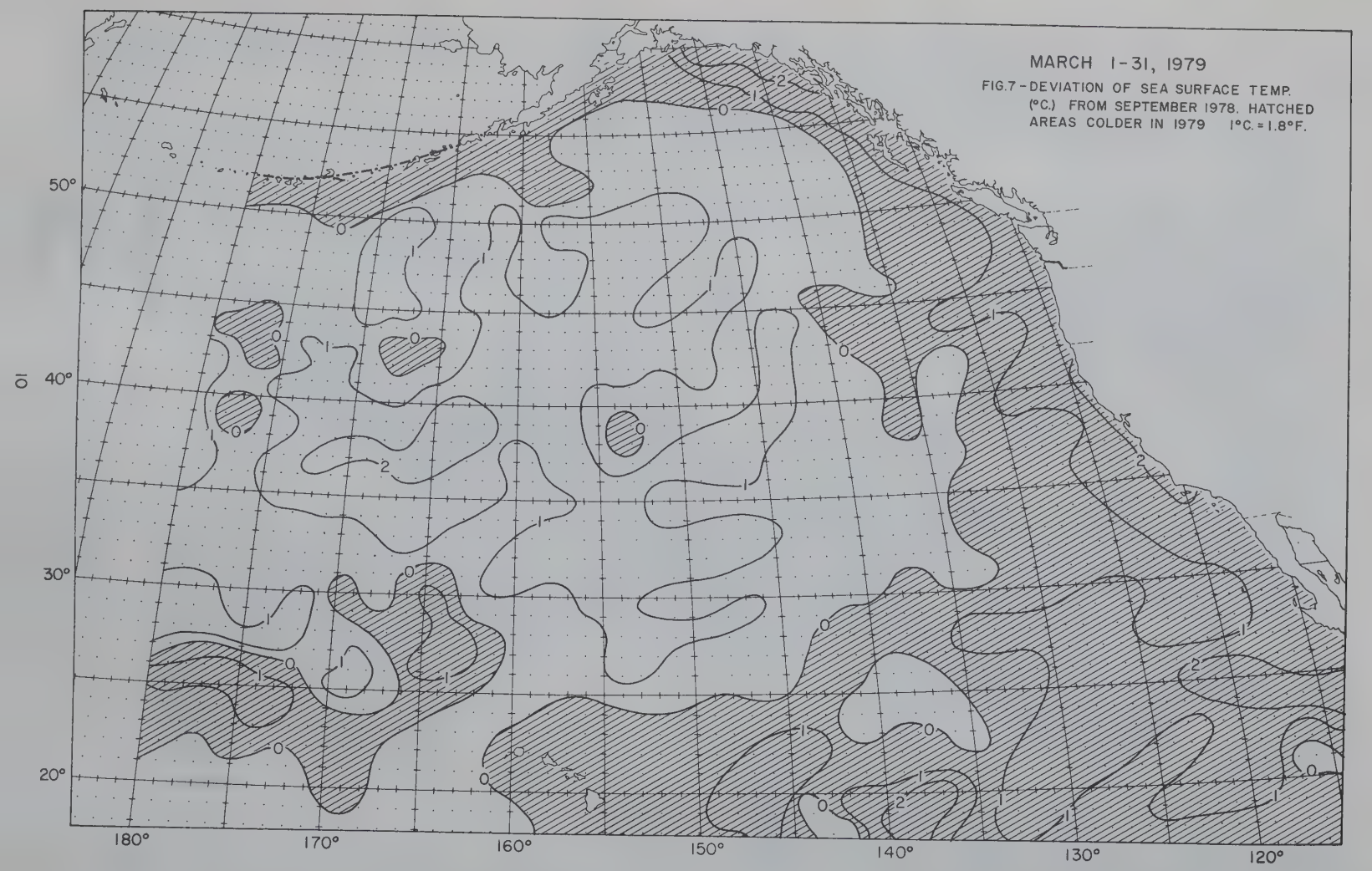
MARCH 1-31, 1979

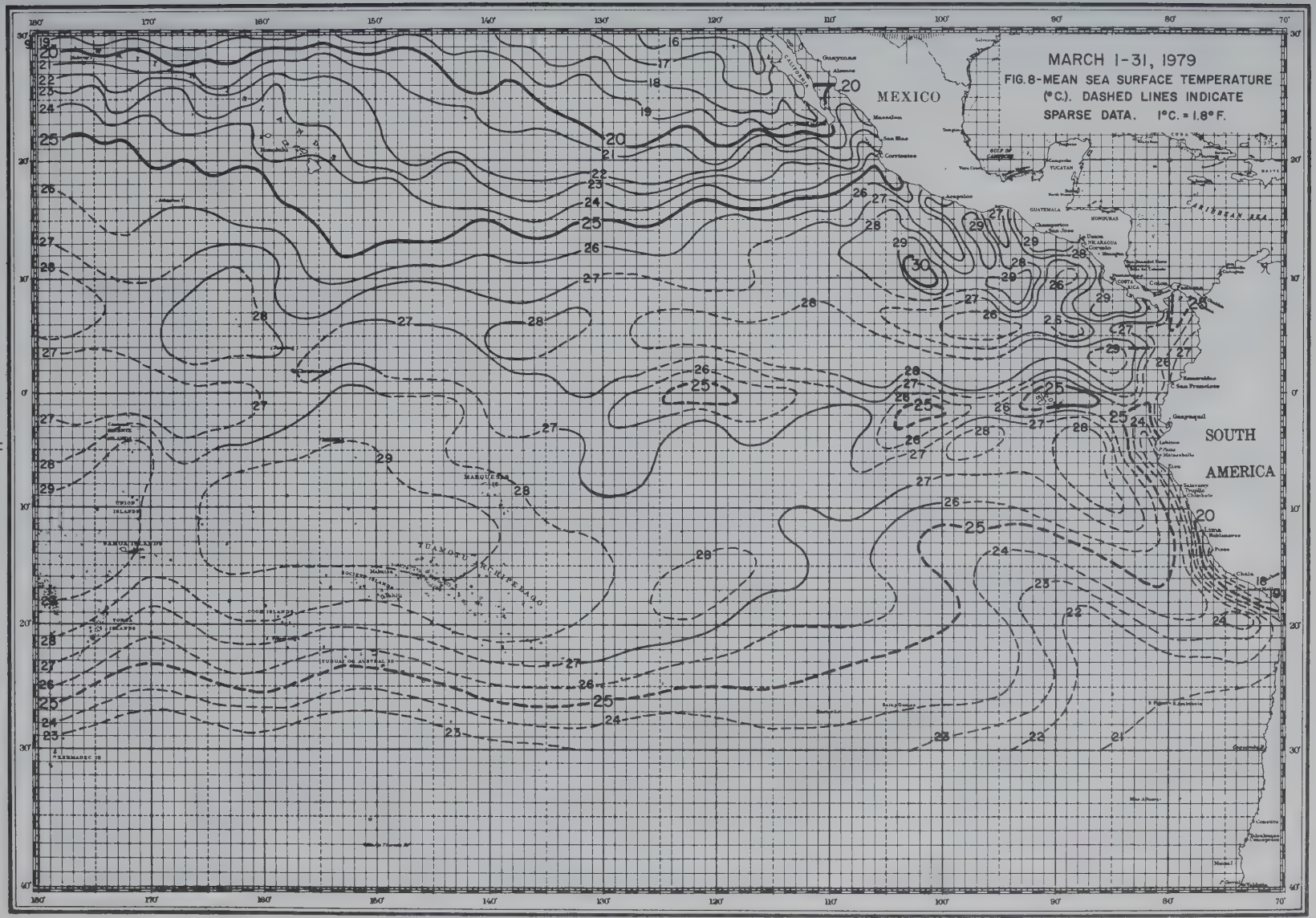
FIG 4-MEAN SEA SURFACE TEMPERATURE (°C)




MARCH 1-31, 1979
FIG. 5 – DEVIATION OF SEA SURFACE TEMP. (°C.) FROM 20 YEAR MEAN (1948-1967). HATCHED AREAS COLDER IN 1979
1°C. = 1.8° F.
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


MARCH 1-31, 1979
FIG. 6 - DEVIATION OF SEA SURFACE TEMP. (°C.)
FROM 20 YEAR MEAN (1948-1967).
HATCHED AREAS COLDER IN 1979.
1° C. = 1.8° F.
60°
50°
40°
30°
20°
120°
130°
140°
150°
160°
170°
180°


MARCH 1-31, 1979
FIG.7-DEVIATION OF SEA SURFACE TEMP. (°C.) FROM SEPTEMBER 1978. HATCHED AREAS COLDER IN 1979 1°C.=1.8°F.
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


MARCH 1-31, 1979
FIG. 8-MEAN SEA SURFACE TEMPERATURE (°C). DASHED LINES INDICATE SPARSE DATA. 1°C. = 1.8° F.
MEXICO
SOUTH AMERICA
CARIBBEAN SEA
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
TUAMOTU ARCHIPELAGO
MARQUESAS
SOCIETY ISLANDS
COOK ISLANDS
TONGA ISLANDS
SAMOA ISLANDS
UNION ISLANDS
KERMADEC IS.
GULF OF CALIFORNIA
YUCATAN
Acapulco
Guaymas
Mazatlan
San Blas
Corrientes
Callao
Guayaquil
Valparaiso
Talcahuano
Chiloe
Juan Fernandez Is.
Easter Island
Galapagos Is.
Tahiti

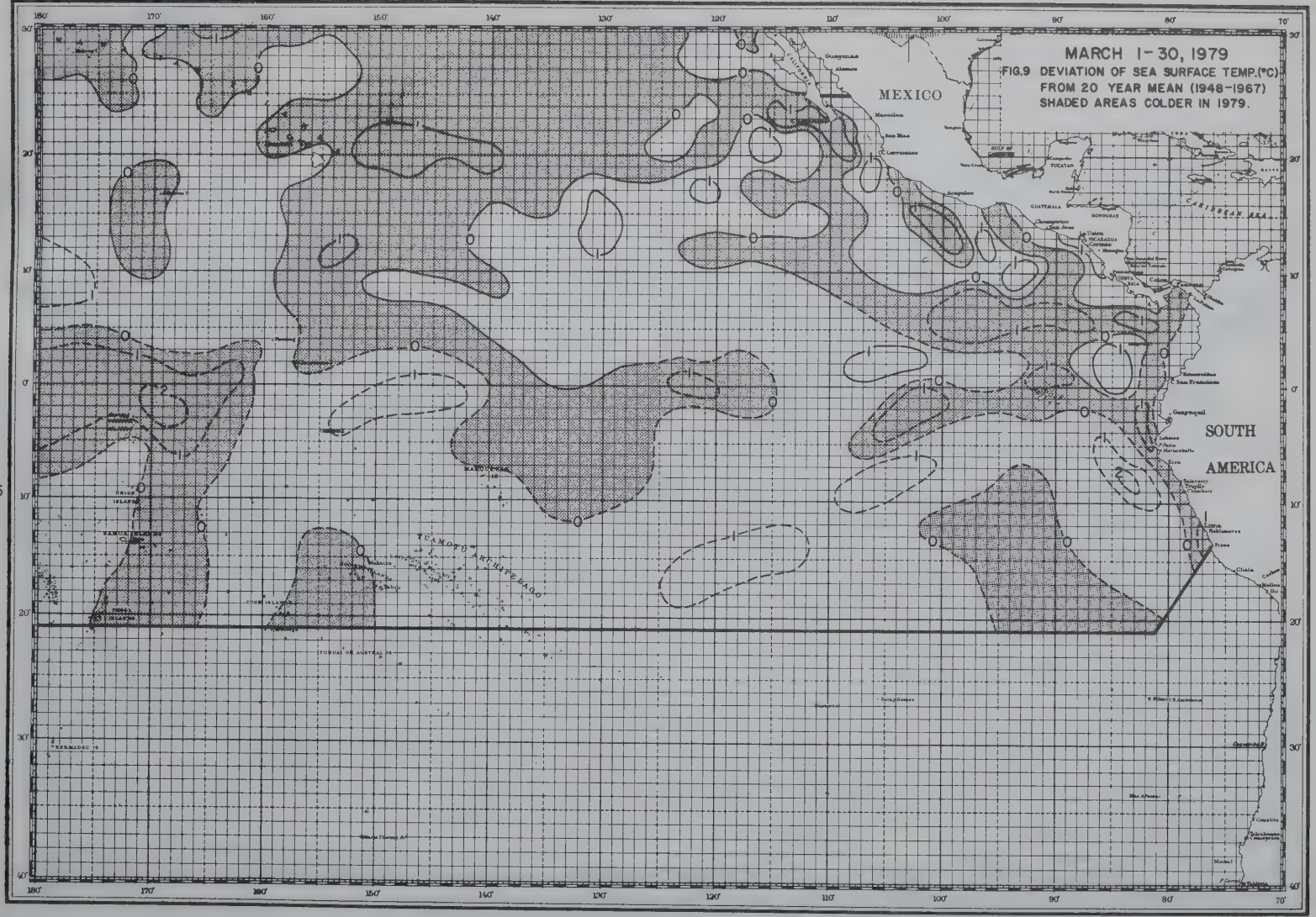
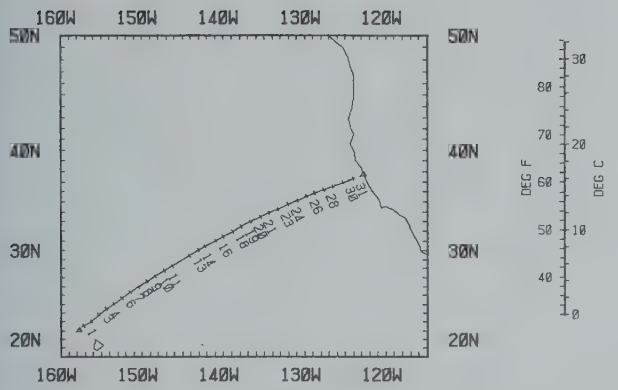

MARCH 1-30, 1979
FIG.9 DEVIATION OF SEA SURFACE TEMP.(°C)
FROM 20 YEAR MEAN (1948-1967)
SHADED AREAS COLDER IN 1979.
MEXICO
SOUTH
AMERICA
TUAMOTU ARCHIPELAGO
180°
170°
160°
150°
140°
130°
120°
110°
100°
90°
80°
70°
30°
20°
10°
0°
10°
20°
30°
40°

FIGURE 10



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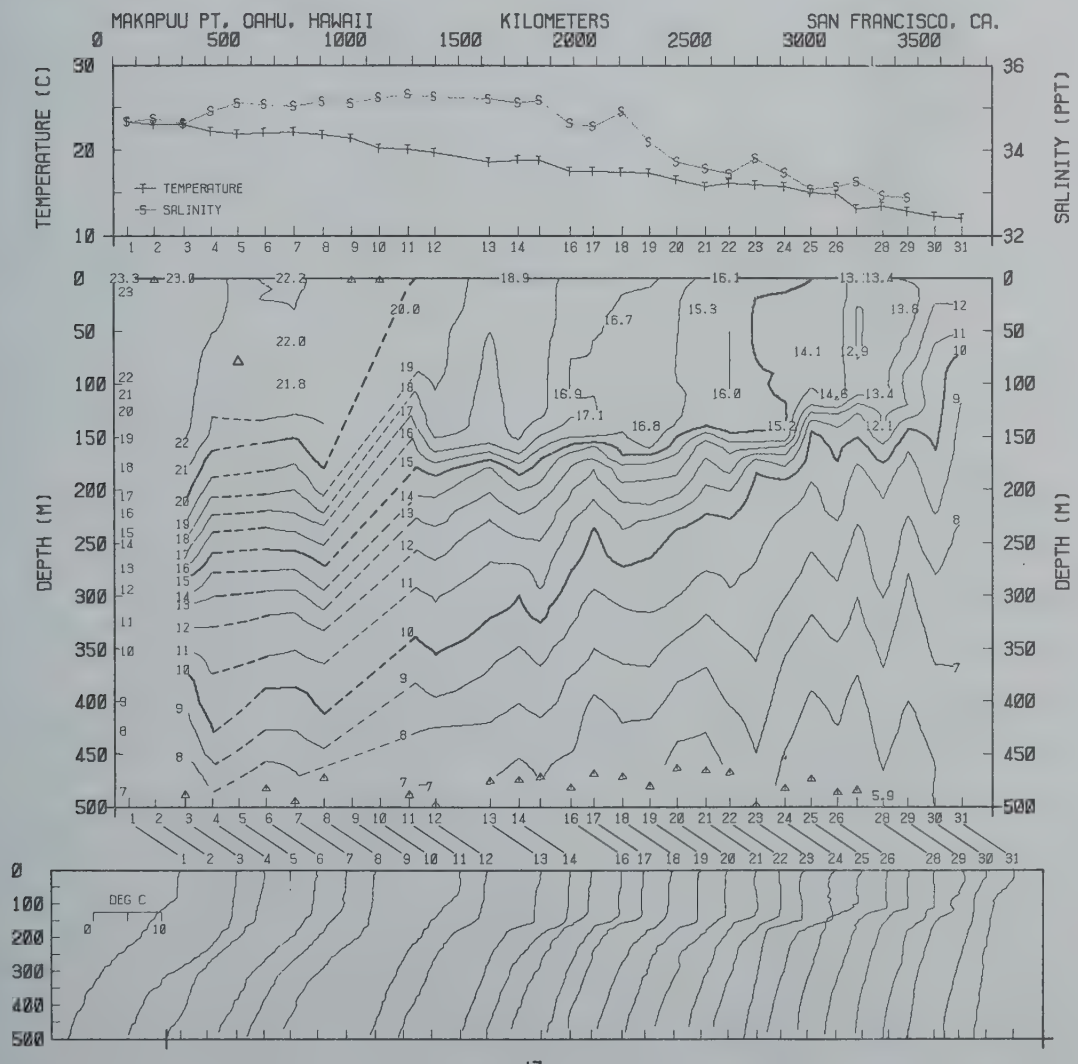

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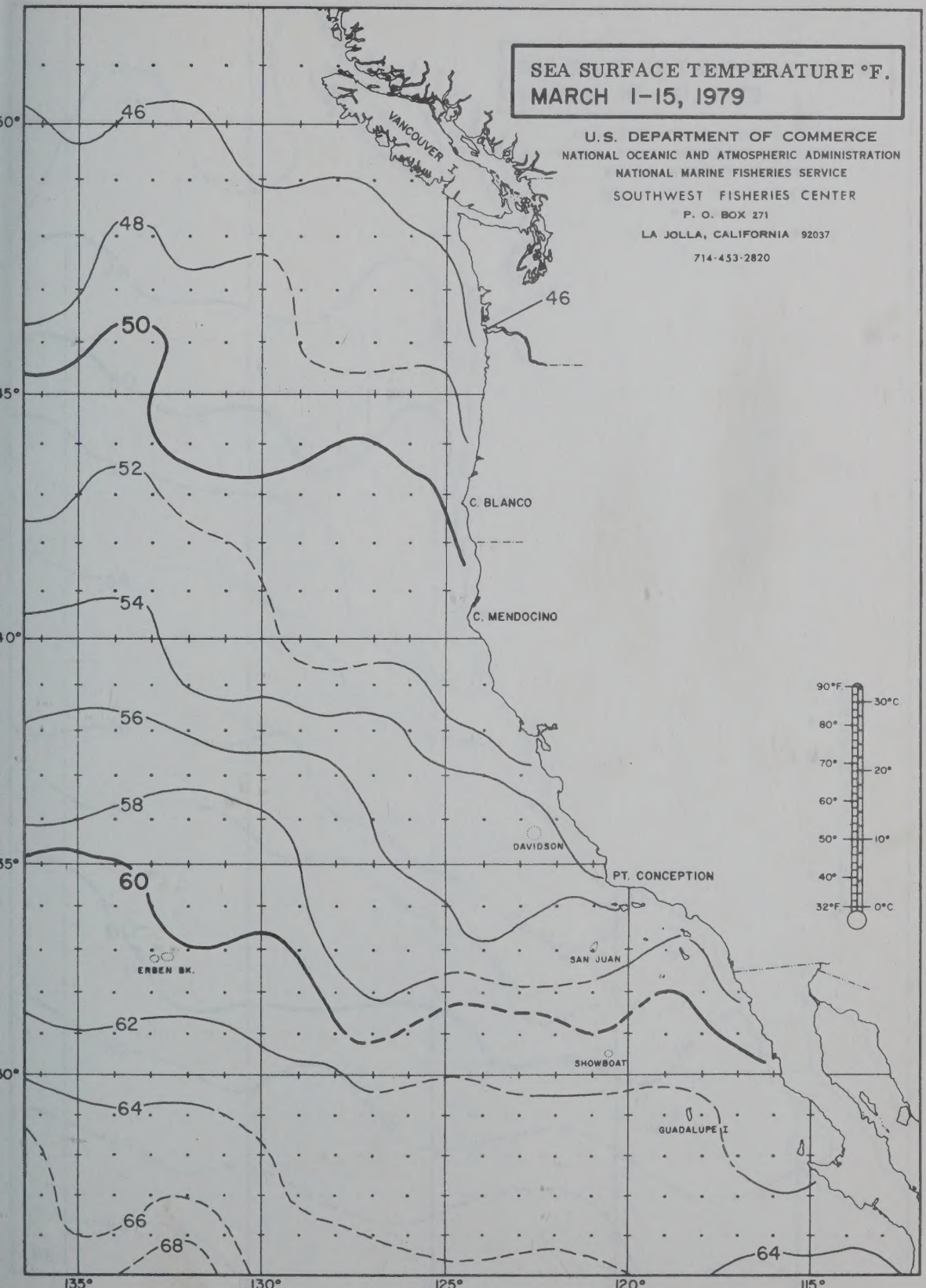

FISHING INFORMATION – supplement